Evaluation of the Topex/Poseidon Altimetry System Over the Great Lakes

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Although satellite radar altimeters arc designed for measuring sea level over the open ocean, an altimeter will establish lock and track over moderate-sized lakes. Temporal changes in the altimeter-derived lake levels are actually a combination of real lake-level variation and altimeter error. If the change in lake level is known, the temporal variation of the altimeter error over the lake can be evaluated.

Collinear analysis of altimeter data over short groundtracks, such as lakes, present different problems than those encountered when analyzing ocean data. Wc have developed a technique to overcome these difficulties, which, for each pass over a lake, returns accurate estimates of the temporal lake level/altimeter error variation. This methodology has been successfully demonstrated with Geosat.

Wc have applied this technique to data collected over the Great Lakes by Topex/Poseidon (GDR-T, GDR-M). Lake levels, obtained from the Great Lakes Division, NOAA/National Ocean Service, were used to eliminate tbc change due to tbc variation of the lakes. The resulting altimeter error for the NASA altimeter system is (at most) 4.7 centimeters RMS. The use of the Topex Microwave Radiometer is shown to provide an average improvement of nearly four centimeters (cm) over FMO wet tropospheric correction. Also, the FMO wet tropospheric correction produces an apparent annual trend in the residuals. Evaluation of the relative bias bet wccn the NASA ALT and CNES SSA1 .T altimeters indicates that there is a 15-20 cm difference with the ALT measuring Shell .